April 12, 1932. G. H. DORGELOH ET AL 1,853,964

ELECTRIC SWITCH

Filed March 15, 1930

Fig. 1.

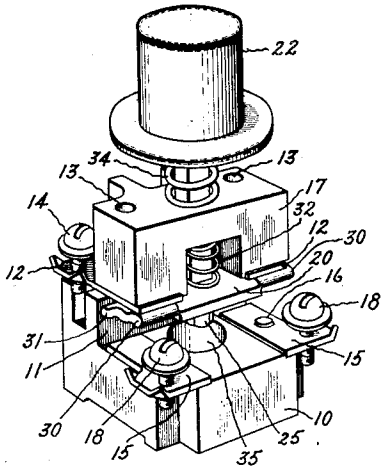


Fig. 2.

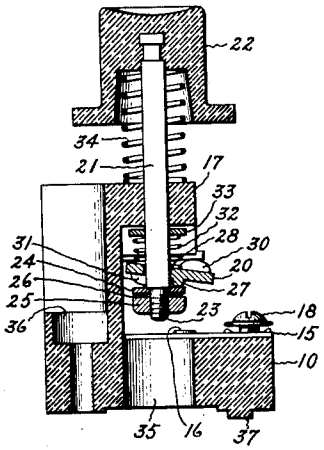


Fig. 3.

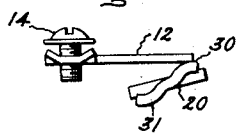


Fig. 4.

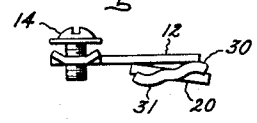


Fig. 5.

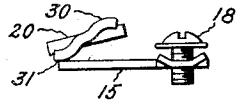
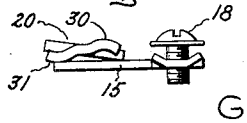


Fig. 6.



Inventors:
George H. Dorgeloh,
Thomas I. Maslin,
by Charles E. Mullen
Their Attorney.

Patented Apr. 12, 1932 1,853,964

UNITED STATES PATENT OFFICE

GEORGE H. DORGELOH, OF EAST ORANGE, AND THOMAS I. MASLIN, OF BLOOMFIELD, NEW JERSEY, ASSIGNORS TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK

ELECTRIC SWITCH

Application filed March 15, 1930. Serial No. 436,195.

Our invention relates to electric switches and more particularly to push button master switches and has for its object the provision of an improved form of switch of small overall size but of ample current carrying and interrupting capacity in which special provision is made for insuring a rolling and wiping action between the switch contacts in order to obtain self-cleaning operation. Our improved form of switch also provides for ease of mounting and wiring and involves only a relatively few parts of simple, rugged and inexpensive construction.

While not necessarily limited thereto, the improvements of the present invention are particularly adapted for use in a double acting push button master switch for controlling both normally open and normally closed circuits. In carrying the invention into effect in such a switch, a single bridging contact member is employed for providing a double break in both the normally open and normally closed circuits and is so mounted on a special off-center rocking pin associated with the push button operating rod that the rolling and wiping action of the bridging member is obtained upon engagement thereof with each of two pairs of stationary contacts mounted in opposing spaced alignment.

In the accompanying drawings Fig. 1 is a perspective view of a double acting push button master switch embodying the improvements of the present invention; Fig. 2 is a sectional view revealing more clearly the details of the mounting arrangement for the bridging contact and Figs. 3, 4, 5 and 6 show diagrammatically the relative positions of the bridging contact as it wipes into engagement with the upper and lower pairs of stationary contacts.

In the preferred form shown in Fig. 1 the double acting push button switch comprises a base or frame 10, preferably formed of moulded insulating material with an open slot 11 located in one side thereof. The pair of stationary contacts 12 are mounted on the block 10 in spaced apart relation at one side of the slot 11, preferably being held in position by rivets anchored in the holes 13 formed in the base 10. The block 10 is suitably formed to provide easy access to the terminal screws 14 by means of which the circuit conductors are connected to the stationary contacts 12.

A second pair of a stationary contacts 15 are mounted on the block 10 on the opposite side of the slot 11, also preferably by means of rivets 16. The upper portion 17 of the block 10 preferably is cutaway to permit ready access to the terminal screws 18 provided for connecting the circuit terminals to the stationary switch contact 15.

The bridging contact member 20 is mounted for movement between the pairs of stationary contacts 12 and 15 on the opposite sides of slot 11. As more clearly shown in Fig. 2, the bridging contact is mounted on the reciprocating operating rod 21 which carries the push button 22 at this upper end. The operating rod 21 preferably is of square or rectangular cross section and has a freely sliding non-rotatable fit with a suitable opening formed in the upper portion 17 of the block 10. The reduced section 23 at the lower end of the operating rod 21 is screw-threaded and carries the projecting collar or washer 24, which is held in position by the nut 25 and lock washer 26. It will be observed that the bridging contact 20 is provided with an off-center rocking pin 27, which preferably is formed by punching out the metal of the contact member as indicated in the drawing. The non-circular opening 28 in the bridging contact member is made somewhat larger than the cross section of the operating rod 21 extending therethrough so as to permit free tilting and rocking movement of the bridging contact member on the rocking pin 27 when the bridging member engages with the stationary contacts cooperating therewith.

It will be noted that the bridging contact member 20 is provided with the skewed contact portions 30 and 31 which project slightly upward and downward from the opposite edges of the bridging contact so as to engage respectively with the upper stationary contacts 12 and the lower stationary contacts 15. In order to yieldingly bias the bridging contact 20 to a position in laterally skewed

alignment with both the upper contacts 12 and the lower contacts 15, the biasing spring 32 is interposed between a collar 33 fixed on the operating rod 21 and the bridging contact 20. With the bridging contact 20 thus biased to a position in laterally skewed alinement with the stationary contacts, the contact portions 30 at one edge of the bridging contact 20 are equidistant from the stationary contacts and the contact portions 31 at the opposite edge of the bridging contact 20 also are equidistant from the stationary contacts but are at a different distance than the contact portions 30. In other words, both contact portions 30 and 31 are in alinement with the stationary contacts but the two portions 30 and 31 are laterally skewed with respect to the stationary contacts. Likewise in order to bias the bridging contact into engagement with the upper pair of stationary contacts 12 and out of engagement with the lower pair of contacts 15, the biasing spring 34 is interposed between the push button 22 and the top of the block 10. The biasing spring 34 is somewhat stronger than the biasing spring 32 and hence serves to operate the bridging contact 20 to the tilted position in which it is shown in Fig. 2, thereby compressing the spring 32.

With the switch thus constructed, the bridging contact 20 normally closes the circuit through the stationary contacts 12 and consequently normally opens the circuit through the stationary contacts 15. Upon operation of the push button 22 to disengage the bridging contact 20 from the stationary contacts 12 and operate the same into engagement with the stationary contacts 15, the tilting and rocking motion imparted to the bridging contact 20 is as follows: As the operating rod 21 is lowered, the biasing spring 32 serves to rock the bridging contact 20 on the rocking pin 27 until the portion of the bridging contact 20, on the opposite side of the operating arm 21 from the rocking pin 27, rests upon the shoulder 24. In this way, as shown in Fig. 3, the skewed portions 30 of the bridging contact 20 are substantially simultaneously disengaged from the pair of spaced apart stationary contacts 12. Thereafter the bridging contact 20 is maintained on the operating rod 21 in skewed alignment with each pair of the stationary contacts. As the downward movement of the operating rod 21 is continued, the skewed portions 31 extending downward from the rear edge of the bridging contact 20 are brought substantially simultaneously into engagement with the lower pair of stationary contacts 15. The substantially simultaneous disengagement of the bridging contact 20 from the stationary contact 12 enables a simultaneous double break to be obtained which is most effective in interrupting the current in the circuit. Also the simultaneous double break distributes the arcing duty between the contacts and thereby prevents localized burning or pitting of any particular contact. Moreover, due to the rocking action of the bridging contact 20, any burning or pitting of the contacts due to arcing is limited to portions of the bridging contacts and of the stationary contacts which are not directly engaged in the normal current carrying position thereof. Upon further downward movement of the operating rod 21, the lower end thereof is carried into the opening 35 in the block 10, and the spring 32 is compressed to permit the bridging contact 20 to tilt on the rocking pin 27. This tilting movement causes the projecting portions 31 to wipe and roll on the stationary contacts 15 thereby cleaning away any dirt, dust or other impediment that might prevent good electrical conducting contact between the bridging contact 20 and the stationary contacts. This wiping action thus maintains the contacts in a clean condition.

Upon the release of the push button 22, the biasing spring 34 returns the bridging contact 20 to its initial position. During this operation, the bridging contact 20 substantially simultaneously disengages the lower pair of stationary contacts 15 returns to its position in skewed alignment with the stationary contacts so that the skewed projecting portions 30 substantially simultaneously engage the upper pair of stationary contacts 12. The further upward movement of the operating rod 21 serves to tilt the bridging contact 20 about the rocking pin 27 and in this way produce a wiping, rolling action of the skewed portions 30 on the stationary contacts 12 as illustrated in Figs. 3 and 4.

Provision is made for readily mounting the switch by providing the recess hole 36 in the block 10 for receiving a holding down screw or bolt. In order to prevent turning of the block 10 about the holding down screw or bolt, the projecting boss 37 is formed to be received into a suitable opening in the member upon which the switch is mounted.

From the foregoing it will be seen that the improved double acting switch embodying the present invention is not only of compact, rugged, and inexpensive construction, permitting ease of mounting and wiring, but also effectively insures self-cleaning, wiping action between the contacts so as always to obtain good contact engagement therebetween.

What we claim as new and desire to secure by Letters Patent of the United States, is,—

1. A switch comprising a pair of spaced apart stationary contacts, a bridging contact therefor, a movable operating member for the bridging contact, and means for tiltably mounting the bridging contact on the operating member in skewed alignment with the stationary contacts to effect substantially si-

multaneous engagement and disengagement therewith with a wiping action.

2. A switch comprising a pair of spaced apart stationary contacts, a bridging contact therefor, a movable operating member for the bridging contact, and means including a rocking pin for tiltably mounting the bridging contact on the operating member in skewed alignment with the stationary contacts to effect a wiping action upon engagement therebetween.

3. A switch comprising a pair of spaced apart contact plates, a bridging contact therefor having skewed projecting portions at the edge thereof for engaging with said stationary contact plates, a movable operating member having the bridging contact tiltably mounted thereon, and means for biasing the bridging contact to a position in laterally skewed alinement with the spaced apart contact plates for effecting substantially simultaneous disengagement and engagement of the skewed projecting portions of the bridging contact with the stationary contact plates with a wiping action.

4. A switch comprising a pair of spaced apart stationary contact plates, a bridging contact having skewed projecting portions at one edge thereof for engaging with said stationary plates, a movable operating member for the bridging contact, and means including a rocking pin for tiltably mounting the bridging contact on the operating member in laterally skewed alignment with the stationary contact plates to effect a wiping action upon engagement therebetween.

5. A double acting switch comprising two pairs of stationary spaced apart contacts mounted in opposing alignment, a movable bridging contact having oppositely skewed projecting portions at the opposite edges thereof for engaging with the stationary contacts, and an operating member extending between the opposing pairs of stationary contacts and having the bridging member tiltably mounted thereon.

6. A double acting switch comprising two pairs of stationary spaced apart contacts mounted in opposing relation, a bridging contact having oppositely skewed projecting portions at the opposite edges thereof for engaging with the stationary contacts, a movable operating member for the bridging contact, and means including a rocking pin for tiltably mounting the bridging contact on the operating member in laterally skewed alignment with each pair of the stationary contacts to effect a wiping action upon engagement therebetween.

In witness whereof, we have hereunto set our hands this 13th day of March, 1930.

GEORGE H. DORGELOH.
THOMAS I. MASLIN.